UNIVERSITI TEKNOLOGI MARA

STUDY ON THE ANTIOXIDANT AND ANTIMICROBIAL PROPERTIES OF PINK GUAVA LEAVES AND SEEDS AND THEIR EFFECTS ON THE SHELF LIFE OF COOKIES

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Thesis submitted in fulfillment of the requirements
for the degree of
Master of Science

Faculty of Applied Sciences

March 2012

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I, hereby, by acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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Faculty	: Applied Sciences
Thesis Title	: Study on the Antioxidant and Antimicrobial Properties of Pink Guava Leaves and Seeds and Their Effects on the Shelf Life of Cookies
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Date	: 26 March 2012

ABSTRACT

This research consists of two parts. The first part is to study the antioxidant and antimicrobial properties of pink guava leaves and seeds aqueous extracts. The samples were investigated for their antioxidant activities (AOA) employing various established *in vitro* assays such as total phenolic content (TPC), total flavonoid content (TFC), ferric-reducing antioxidant power (FRAP), 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical-scavenging ability, β-carotene bleaching assay and Oxygen Radical Absorbance Capacity (ORAC). Oxidative stability using accelerated study in the fat system was also conducted using Rancimat method. From the study, guava leaves extract had the highest TPC and TFC than guava seeds extracts. Guava leaves extract exhibited strong efficiency and showed over 90% scavenging effect of DPPH at a concentration of 200 µg/ml. The inhibition of lipid peroxidation of BHA/BHT by using β-carotene bleaching assay was significantly higher than all plant extracts tested. In accelerated study using rancimat method, addition of natural extracts exerted potent antioxidant effects in retarding fat oxidation which was comparable to BHA/BHT combination. From this study, the antioxidant activity of pink guava leaves and seeds were found to increased proportionally with total phenolic content. Correlations between total phenolic content and antioxidant activity were investigated. The identification of flavonoids was also determined by using HPLC. Two types of flavonoids detected in guava leaves extract were myricetin (95.894± 2.8 mg/g extract) and quercetin (70.022± 7.1 mg/g extract) while in guava seeds extracts, only catechin was detected (247.442 ± 36.3 mg/g extract). Antimicrobial test using disc diffusion method was employed. Guava leaves extracts displayed a stronger antimicrobial effect against gram positive bacteria (*S. aureus* and *B. subtilis*). The second part of the study is to evaluate the effect of guava leaves and seeds extracts on the shelf life of cookies stored at room temperature for 3 months. Seven formulations consisted of: control sample (cookies without addition of antioxidant) (F1), cookies with BHA/BHT extract (F2), with 100 ppm leaves extract (F3), with 200 ppm leaves extract (F4), with 900 ppm seeds extract (F5), with 1300 ppm seeds extracts (F6) and with combination of 100 ppm leaves and 100 ppm seeds extracts (F7). Results for oxidative stability tests on the cookies using Peroxide Value (PV) and Thiobarbituric Acid (TBA) showed that all samples added with plant extracts and BHA/BHT slowed down the rate of peroxide formation throughout the storage period. All samples were able to maintain PV less than 10 mEq/kg until 12 weeks of storage. For yeast and mould count, addition of plant extracts and BHA/BHT were able to delay the growth of yeast and mould until week 8. From the sensory evaluation tests conducted on the samples, the presence of plant extracts in the cookies formulations were not detected by the panelists.

ACKNOWLEDGEMENTS

This thesis would not have been possible without the help of countless individuals. First of all, I would like to express my sincere appreciation to my dear supervisor Assoc. Prof. Dr Noriham Abdullah and my co-supervisor Assoc. Prof. Dr Zainon Md Noor for their guidance and supervision to make this project possible and successful. I would like to thank En. Ahmad Kambali, the Senior Laboratory Assistant of Prograduate Laboratories, UiTM and Laboratory staff of the Department of Food Technology especially Pn. Nora, Pn. Siti, Cik Hariyah, Cik Shuhada, En. Osman and En. Fadzli for their kindness and cooperation. I would also like to thank my lecturers, laboratory assistant and technical staff of the Faculty of Applied Sciences, Universiti Teknologi MARA, who had directly or indirectly involved in the completion this project. Above all, a very special thanks goes to my loving parents and family, my 409 labmates and friends for their concern, understanding and encouragement during the preparation of this project paper. I would also like to extend my thanks to Ministry of Science, Technology and Innovation (MOSTI) and Universiti Teknologi MARA for the financial supports.

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